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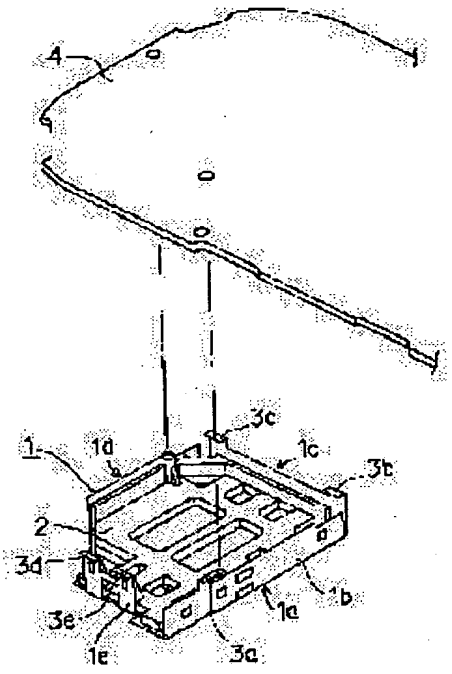
(54) MOBILE TERMINAL BUILT-IN ANTENNA

(57)Abstract:
PROBLEM TO BE SOLVED: To attain cost reduction, miniaturization and making it high-weight, when an antenna is composed of planar antenna elements.
SOLUTION: An antenna part 1 is prepared from a thin metal sheet, and the antenna part 1 is structurally reinforced by tightly adhering a reinforced part 2 to this antenna part 1. Specifically, the reinforced part 23 is formed by having a resin flow into the antenna part 1 through an insert/outsert molding method. In such a case, the thickness of the resin can be made thin in comparison with the case of formation through the insert molding method. The antenna part 1 tightly adhering the reinforced part 2 like this is loaded on a printed wiring board 4, while using an automatic loading device. Namely, the automatic loading device sucks the top face part of antenna part 1, carries it onto the printed wiring board 4, and respectively locates plural leg parts 3a-3e on the correspondent lands of a printed wiring board 4. Then, reflow soldering is performed, and the antenna part 1 is fixed on the printed wiring board 4.



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CLAIMS

[Claim(s)]
[Claim 1] The antenna with a built-in move terminal which is characterized by providing the following and which consists of tabular antenna elements The antenna section which has two or more lateral portions which stand in a row in the top panel section and the top panel section concerned, and consists of sheet metal Two or more foots which stick to the aforementioned antenna section, are installed in the opposite side edge section of the top panel section of the reinforcement section which consists of a resin which reinforces the aforementioned antenna section, and at least two lateral portions of the aforementioned antenna section, respectively, and are soldered to a printed wired board and which consist of sheet metal
[Claim 2] The aforementioned reinforcement section is an antenna according to claim 1 with a built-in move terminal characterized by being formed by an insertion / the outsert fabricating method to the aforementioned antenna section.
[Claim 3] It is the antenna according to claim 2 with a built-in move terminal characterized by being formed as the aforementioned end lifting section is wrapped in in case the aforementioned antenna section was projected to the side in which the aforementioned reinforcement section is located and the aforementioned reinforcement section is formed by an insertion / the outsert fabricating method to the aforementioned antenna section including the lifting section.
[Claim 4] The aforementioned end lifting section is an antenna according to claim 3 with a built-in move terminal characterized by being prepared in the top panel section of the aforementioned antenna section, and at least one lateral portion, respectively.
[Claim 5] The aforementioned end lifting section is an antenna according to claim 4 with a built-in move terminal which is formed each in the top panel sections of the aforementioned antenna section, and two or more aforementioned lateral portions of all one at least, and is characterized by forming the aforementioned reinforcement section along with the top panel sections of the aforementioned antenna section, and two or more aforementioned lateral portions of all.
[Claim 6] The aforementioned antenna section is an antenna according to claim 1 with a built-in move terminal characterized by being arranged in the position which counters the grounding pattern of a printed wired board.
[Claim 7] The aforementioned antenna section is an antenna according to claim 1 with a built-in move terminal characterized by achieving the function of reverse F antennas.
[Claim 8] Each end face of two or more aforementioned foots is an antenna according to claim 1 with a built-in move terminal characterized by being located on the same side.
[Claim 9] The side which the aforementioned back up plate is located in the space surrounded by the top panel section and two or more lateral portions of the aforementioned antenna section, and does not have the aforementioned reinforcement section of the top panel section of the aforementioned antenna section is an antenna according to claim 1 with a built-in move terminal characterized by being a flat surface so that it may adsorb at the time of automatic mounting.
[Claim 10] Two specific lateral portions which the aforementioned antenna section adjoins are antennas according to claim 1 with a built-in move terminal characterized by the angle which both sides make being right-angled while being a flat surface, respectively.
[Claim 11] It is the antenna according to claim 1 with a built-in move terminal which two of two or more aforementioned foots are used for electric supply, and is characterized by soldering the remaining foot to the float land of a printed wired board.
[Claim 12] The aforementioned reinforcement section is an antenna according to claim 1 with a built-in move terminal characterized by including two or more ribs in an angle.
[Claim 13] The aforementioned reinforcement section is an antenna according to claim 1 with a built-in move terminal characterized by including two or more pins in the position corresponding to two or more

locating holes formed in the aforementioned printed wired board side, respectively.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Especially this invention relates to the antenna with a built-in move terminal which consists of tabular antenna elements about an antenna with a built-in move terminal.
[0002] Low-cost-izing of a move terminal, a miniaturization, lightweight-ization, etc. are called for with the spread of mobile communications, such as a cellular phone and PHS. Although the move terminal is usually equipped with the whip antenna and the built-in antenna, a built-in antenna also needs to meet such a demand. As a built-in antenna of the move terminal which uses the electric wave of a 800MHz band, a 1.5GHz band, etc., usually, a tabular antenna element is used and reverse F antennas etc. are constituted in many cases.
[0003]
[Description of the Prior Art] Drawing 6 and drawing 7 are the decomposition perspective diagrams showing the example of the structure of the built-in antenna of the conventional move terminal. With the built-in antenna shown in drawing 6 , the sheet metal section 101 used as an antenna is fixed to the box-like mould resin object 103 by the double-sided tape 102. The mould resin object 103 is attached in the predetermined position of a printed wired board 104 through a shield board (illustration ellipsis). Through lead wire (illustration ellipsis), it is soldered to the predetermined circuit of a printed wired board 104, or the sheet metal section 101 is connected to the predetermined circuit of a printed wired board 104 through a contact-surface article (illustration ellipsis). The sheet metal section 101 acts with a shield board (grounded), and constitutes reverse F antennas.
[0004] With the built-in antenna shown in drawing 7 , the vacuum evaporationo of the metal particles is carried out to the box-like mould resin object 105, and a metal membrane 106 is formed. Others are the same as that of the built-in antenna shown in drawing 6 , and the mould resin object 105 is attached in the predetermined position of a printed wired board 107 through a shield board (illustration ellipsis). Through lead wire (illustration ellipsis), it is soldered to the predetermined circuit of a printed wired board 107, or a metal membrane 106 is connected to the predetermined circuit of a printed wired board 107 through a contact-surface article (illustration ellipsis).
[0005]
[Problem(s) to be Solved by the Invention] As mentioned above, although a built-in antenna is also asked for low-cost-izing, a miniaturization, lightweight-ization, etc., with equipment, it has conventionally the structure where the sheet metal section 101 used as an antenna and a metal membrane 106 are connected to a printed wired board 104,107 through lead wire or a contact-surface article. Therefore, such an antenna part could not be automatically mounted in the printed wired board 104,107, but it had become the cause which cannot make a manufacturing cost low. Moreover, the vacuum evaporationo of the labor cost concerning fixation on the mould resin object 103 of the sheet metal section 101 and the metal particles which are needed in order to form a metal membrane 106 had also caused high cost. Furthermore, since those arrangement spaces were structurally required while causing cost quantity, since lead wire and the contact-surface article were needed, it had become the obstacle of a miniaturization. The fall of reliability had become [the poor contact] being easy to generate use of a contact-surface article a problem.
[0006] Moreover, although the mould resin object 103,105 was formed by insert molding, in order to obtain necessary intensity, a certain amount of thickness is required, and, for the reason, there was a problem that-izing could not be carried out [lightweight]. Although the metal membrane 106 contributed to lightweight-ization, there was a fault that it was high cost.
[0007] this invention is made in view of such a point, and it aims at offering the antenna with a built-in move terminal which attained low-cost-izing, miniaturization, and lightweight-ization.
[0008]

[Means for Solving the Problem] In this invention, in order to attain the above-mentioned purpose, the antenna with a built-in move terminal which consists of the following composition is offered. Drawing 1 is drawing having shown this antenna with a built-in move terminal from the base side. The antenna section 1 which the antenna with a built-in move terminal of this invention has two or more lateral portions 1b-1e which stand in a row in top panel section 1a and this top panel section 1a, and consists of sheet metal, It sticks to the antenna section 1, is installed in the opposite side edge section of the top panel section of the reinforcement section 2 which consists of a resin which reinforces the antenna section 1, and at least two lateral portions of the antenna section 1, respectively, and consists of two or more foots 3a-3e which are soldered to a printed wired board 4 and which consist of sheet metal.

[0009] Moreover, the reinforcement section 2 is formed by an insertion / the outsert fabricating method to the antenna section 1. In the above composition, the antenna section 1 is created with thin sheet metal, the reinforcement section 2 is stuck in this antenna section 1, and structural reinforcement of the antenna section 1 is performed. Specifically, a resin is slushed by an insertion / the outsert fabricating method inside the antenna section 1, and the reinforcement section 2 is formed. Thickness of the resin in this case is thinly made compared with the case where it forms by the insert molding method.

[0010] In this way, a printed wired board 4 is loaded with the antenna section 1 stuck to the reinforcement section 2 using automatic mounting equipment. That is, automatic mounting equipment adsorbs the top panel section of the antenna section 1, it carries on a printed wired board 4, and two or more foots 3a-3e are positioned in the land of correspondence of a printed wired board 4, respectively. Then, reflow soldering is performed and the antenna section 1 is fixed to a printed wired board 4.

[0011] As mentioned above, since it is later stuck to the reinforcement section 2 by the antenna section 1 and is reinforced, it becomes possible to create the antenna section 1 with thin sheet metal. Moreover, since the antenna section 1 is used as a mold, a resin is slushed there and adhesion formation of the reinforcement section 2 is carried out, thickness of the resin which constitutes the reinforcement section 2 can be made comparatively thin. By such thing, lightweight-ization of the antenna section 1 and the reinforcement section 2 is realized.

[0012] Moreover, since the antenna section 1 and the reinforcement section 2 can be automatically mounted now in a printed wired board 4, low-cost-ization is realized. Furthermore, lead wire and a contact-surface article become unnecessary, and miniaturization, low-cost-izing, and lightweight-ization are realized.

[0013]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. First, the principle composition of the gestalt of operation of the antenna with a built-in move terminal concerning this invention The antenna section 1 which has two or more lateral portions 1b-1e which stand in a row in top panel section 1a and this top panel section 1a, and consists of sheet metal as shown in drawing 1 , It sticks to the antenna section 1, is installed in the opposite side edge section of the top panel section of the reinforcement section 2 which consists of a resin which reinforces the antenna section 1, and at least two lateral portions of the antenna section 1, respectively, and consists of two or more foots 3a-3e which are soldered to a printed wired board 4 and which consist of sheet metal.

[0014] Moreover, the reinforcement section 2 is formed by an insertion / the outsert fabricating method to the antenna section 1. In the above composition, the antenna section 1 is created with thin sheet metal, the reinforcement section 2 is stuck in this antenna section 1, and structural reinforcement of the antenna section 1 is performed. Specifically, a resin is slushed by an insertion / the outsert fabricating method inside the antenna section 1, and the reinforcement section 2 is formed. Thickness of the resin in this case is thinly made compared with the case where it forms by the insert molding method.

[0015] In this way, a printed wired board 4 is loaded with the antenna section 1 stuck to the reinforcement section 2 using automatic mounting equipment. That is, automatic mounting equipment adsorbs the top panel section of the antenna section 1, it carries on a printed wired board 4, and two or more foots 3a-3e are positioned in the land of correspondence of a printed wired board 4, respectively. Then, reflow soldering is performed and the antenna section 1 is fixed to a printed wired board 4.

[0016] As mentioned above, since it is later stuck to the reinforcement section 2 by the antenna section 1 and is reinforced, it becomes possible to create the antenna section 1 with thin sheet metal. Moreover, since the antenna section 1 is used as a mold, a resin is slushed there and adhesion formation of the reinforcement section 2 is carried out, thickness of the resin which constitutes the reinforcement section 2 can be made comparatively thin. By such thing, lightweight-ization of the antenna section 1 and the reinforcement section 2 is realized.

[0017] Moreover, since the antenna section 1 and the reinforcement section 2 can be automatically mounted now in a printed wired board 4, low-cost-ization is realized. Furthermore, lead wire and a

contact-surface article become unnecessary, and miniaturization, low-cost-izing, and lightweight-ization are realized.

[0018] Next, the form of this operation is explained in detail. Drawing 2 and drawing 3 are the decomposition perspective diagrams of the antenna section 1 and the reinforcement section 2, and drawing which looked at drawing 2 from the top panel side, and drawing 3 are drawings seen from the base side. In addition, in drawing 2 and drawing 3 , the same reference mark is given to the same component as the component shown in drawing 1 .

[0019] In order for the antenna section 1 to consist of thin sheet metal and to have a function as reverse F antennas, while the slit sections 5a-5c are formed, bending processing is performed and top panel section 1a and lateral portions 1b-1e are formed. Top panel section 1a is a flat surface, and automatic mounting equipment is tending to adsorb [come]. Lateral portions 1b and 1c also serve as a flat surface, respectively, and lateral portion 1b and lateral portion 1c make a right angle.

[0020] lateral portion 1b -- a foot -- 3a is installed, similarly, Foots 3b and 3c are installed in lateral portion 1c, and Foots 3d and 3e are installed in lateral portion 1e The end face of the side which touches the printed wired board 4 of Foots 3a-3e, respectively is processed so that it may become the same field, and it has secured the stability when being mounted in a printed wired board 4 by automatic mounting equipment.

[0021] Furthermore, it cuts to top panel section 1a of the antenna section 1, and lifting section 6a is prepared, it cuts to lateral portion 1b similarly, the lifting sections 7a-7e are cut to lateral portion 1c, the lifting sections 8a and 8b are cut to 1d of lateral portions, and the lifting sections 10a and 10b are formed. It cuts, and in top panel section 1a and lateral portions 1b-1e, the lifting sections 6a-10b choose these portions that it bends backward and smoothness seldom obtains, and prepare them.

[0022] Drawing 4 (A) is the perspective diagram in which cutting and showing the structure of lifting section 6a. That is, slitting is put into sheet metal and a few is bent inside the antenna section 1. Others cut, the structure of the lifting sections 7a-10b is also cut, and it is the same as lifting section 6a.

[0023] To such the antenna section 1 which cut and was equipped with the lifting sections 6a-10b, a resin is poured into the inside by an insertion / the outsert fabricating method, and the reinforcement section 2 is formed. Then, as shown, for example in drawing 4 (B), it cuts, and a resin turns and solidifies so that lifting section 6a may be wrapped in. Therefore, adhesion fixation of the reinforcement section 2 will be carried out at the antenna section 1, and the antenna section 1 which consists of thin sheet metal will be reinforced by the reinforcement section 2. In addition, at the time of an insertion / outsert fabrication, since it is possible to hold each part of the antenna section 1 with a sufficient precision, also structurally, the antenna section 1 after the mould was carried out can secure close dimensional accuracy. Moreover, also in the reinforcement section 2, the resin thickness can be made thin from the antenna section 1 and the relation to stick compared with the case where do not stick with the antenna section 1 but it becomes independent. In addition, as are shown in drawing 2 and drawing 3 , and many holes are established in the reinforcement section 2, it is made to make the weight light. Furthermore, especially, although a rib is prepared in the reinforcement section 2 and an angle is reinforced at it, since slit section 5c exists, by lateral portion 1e, this rib is prepared in the both sides of slit section 5c.

[0024] Drawing 5 is drawing showing signs that the antenna section 1 by which adhesion fixation of the reinforcement section 2 was carried out is mounted in a printed wired board 4. That is, top panel section 1a is a flat surface, and when automatic mounting equipment adsorbs the top panel section 1a, the antenna section 1 is sucked up. Here, although the reinforcement section 2 is naturally also sucked up, both will be doubled and it will be expressed as "the antenna section 1."

[0025] As mentioned above, since lightweight-ization is realized, automatic mounting equipment can suck up the antenna section 1 easily. And automatic mounting equipment moves and lays the antenna section 1 in the predetermined position of a printed wired board 4, after performing alignment of the antenna section 1 by applying the portion of lateral portion 1b and lateral portion 1c which cross right-angled to a predetermined fixture [drawing 5 (A)]. Since each edge of the foots 3a-3e of the antenna section 1 is located in a coplanar at this time, though the antenna section 1 is forced on a printed wired board 4 by automatic mounting equipment, without shaking, it does not deform.

[0026] Then, Foots 3a-3e are soldered and fixed to each land of a printed wired board 4 by reflow soldering [drawing 5 (B)]. Since Foots 3d and 3e serve as a terminal for antenna electric supply, although each land soldered to Foots 3d and 3e, respectively is connected to the predetermined circuit in a printed wired board 4, each land soldered to other foots 3a-3c, respectively is a float land.

[0027] moreover -- the portion which the antenna section 1 in a printed wired board 4 counters -- a grounding pattern -- preparing -- **** -- it is made like and made for this grounding pattern and the antenna section 1 to constitute reverse F antennas

[0028] As mentioned above, the thickness of the resin which becomes possible [creating the antenna

section 1 with thin sheet metal], and constitutes the reinforcement section 2 can also be comparatively thin, and it can carry out now. Lightweight-ization of the antenna section 1 and the reinforcement section 2 is realizable with such a thing.

[0029] Moreover, since the antenna section 1 and the reinforcement section 2 can be automatically mounted now in a printed wired board 4, low-cost-ization is realized. Moreover, the lead wire and the contact-surface article which were the need conventionally become unnecessary, and miniaturization, low-cost-izing, and lightweight-ization are realized. Moreover, the problem resulting from the poor contact of a contact is also avoidable.

[0030] Moreover, since it stops also generating deformation by the help at the time of manufacture of the antenna section 1 which might exist conventionally, and deformation by the shock at the time of use, aggravation of the electrical property of an antenna can be prevented. In addition, two or more pins are prepared in the printed wired board 4 side of the reinforcement section 2 as other operation gestalten of the gestalt of the above operation, a pin hole is prepared in the position corresponding to those pins of a printed wired board 4, and it may be made to position the reinforcement section 2 to a printed wired board by this.

[0031]

[Effect of the Invention] As explained above, the reinforcement section of a resin is stuck in the antenna section of sheet metal with the foot, and it reinforces with this invention mechanically, and the foot was directly soldered to the printed wired board. The thickness of the resin which becomes possible [creating the antenna section with thin sheet metal] by this, and constitutes the reinforcement section can also be comparatively thin, and it can carry out now, therefore lightweight-ization of the antenna section and the reinforcement section was realized.

[0032] Moreover, the reinforcement section was formed, as it cut in the antenna section, the lifting section was prepared and this was wrapped in by an insertion / outsert fabrication of a resin. Thereby, sticking the antenna section and the reinforcement section certainly simply was realized. Curvature return of the antenna section which consists of thin sheet metal by this adhesion was able to be suppressed.

[0033] Moreover, the stability when placing the antenna section on a printed wired board was secured by locating each end face of two or more foots on the same field. The top panel section of the antenna section is made into a flat surface, and it was made to adsorb at the time of automatic mounting. And alignment of them was made easy to carry out, as the angle which both sides make becomes right-angled, while making into a flat surface two specific lateral portions which the antenna section adjoins, respectively. By realization of such things and lightweight-izing, the antenna section can be automatically mounted now in a printed wired board, and low-cost-ization was realized.

[0034] Furthermore, the lead wire and the contact-surface article which were the need conventionally became unnecessary again, and miniaturization, low-cost-izing, and lightweight-ization were realized. Moreover, the problem resulting from the poor contact of a contact was also avoidable.

[0035] Moreover, since it stopped having also generated deformation by the help at the time of manufacture of the antenna section which might exist conventionally, and deformation by the shock at the time of use, aggravation of the electrical property of an antenna could be prevented.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is principle explanatory drawing of this invention.
[Drawing 2] It is the decomposition perspective diagram of the antenna section seen from the top panel side, and the reinforcement section.
[Drawing 3] It is the decomposition perspective diagram of the antenna section seen from the base side, and the reinforcement section.
[Drawing 4] (A) is the perspective diagram in which cutting and showing the structure of the lifting section, and (B) is the cross section showing signs that poured the resin into the inside by the insertion / the outsert fabricating method, and the reinforcement section was formed to the antenna section which cut and was equipped with the lifting section.
[Drawing 5] The reinforcement section is drawing showing signs that the antenna section by which adhesion fixation was carried out is mounted in a printed wired board, and, in (A), (B) shows the situation at the time of soldering fixation at the time of alignment.
[Drawing 6] It is the decomposition perspective diagram showing the 1st example of the structure of the built-in antenna of the conventional move terminal.
[Drawing 7] It is the decomposition perspective diagram showing the 2nd example of the structure of the built-in antenna of the conventional move terminal.
[Description of Notations]
1 Antenna Section
1a-1e Lateral portion
2 Reinforcement Section
3a-3e Foot
4 Printed Wired Board

[Translation done.]